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Case Docket No. 7304
Date: August 17, 2007

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Re: Application of: Jaffee
Serial No.: 10/607,858
Filed: June 27, 2003
For: GYPSUM BOARD FACED WITH NON-WOVEN GLASS FIBER MAT

Art Unit: 1771
Examiner: CHOI, Peter Y.

Transmitted herewith is/are the following document(s) related to the above-identified application:

- Notice of Appeal
- Appeal Brief (67 pages)
- Request for Oral Hearing

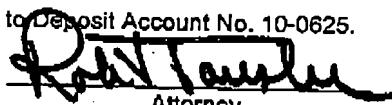
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Attorney Docket No.: 7304/0140-2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Alan M. Jaffee Group Art Unit: 1771
Serial No.: 10/607,858 Examiner: Peter Y. Choi
Filed: June 27, 2003
For: Gypsum Board Faced With Non-Woven Glass Fiber Mat
Docket No.: 7304/0140-2

Littleton, CO 80127
August 20, 2007

Board of Patent Appeals and Interferences
United States Patent and Trademark Office
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APPEAL BRIEF

This Brief is in furtherance of the Notice of Appeal entered June 20, 2007
in the above-identified application.

Fees required under 37 C.F.R. §1.17(f) are set forth in the accompanying
Transmittal of Appeal Brief.

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(I) Real Party in Interest

The real party in interest is Johns Manville International, Inc., as evidenced by a clear chain of Assignment of the entire right, title, and interest by the inventor.

In particular, the entire right, title, and interest was assigned by inventor Alan M. Jaffee to Johns Manville International, Inc., the assignment having been executed on August 20, 2003, and recorded in the U.S. Patent Office on September 29, 2003, at reel 014550, frame 0164.

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(II) Related Appeals and Interferences

The subject matter of the present invention is related to subject matter delineated in US Application Serial No. 10/608,790, which is commonly owned with the instant application and was filed on the same day as the instant application.

There are no other appeals or interferences known to the applicant or to the appellant's legal representative, which will directly affect or be directly affected by, or have a bearing on, the Board's decision in the pending appeal.

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(III) Status of Claims

The claims on appeal are claims 1-6, 8-15, 17-27, and 29-32, which were finally rejected in the Office Action dated December 27, 2006. A copy of these claims, as amended, is set forth in Section IX – Claims Appendix.

Claim 28 stands withdrawn as being directed to a different invention.

Claims 7 and 16 have been cancelled during prosecution.

Claims 1-6, 8-15, 17-19, 21-24, 26-27, and 29-32 stand rejected under 35 USC 103(a) as being unpatentable over US Patent 5,772,846 to Jaffee.

Claim 20 stands rejected under 35 USC 103(a) as being unpatentable over Jaffee in view of US Patent 6,365,533 to Horner, Jr., et al.

Claim 25 stands rejected under 35 USC 103(a) as being unpatentable over Jaffee in view of US Patent 7,056,582 to Carbo.

The prosecution history of the present application includes the following substantive Office Actions, with mailing dates as indicated:

- December 27, 2004 – Non-Final – (hereinafter, “the First Office Action”);
- August 15, 2005 – Final – (“the Second Office Action”); and
- October 24, 2006 – Advisory Action – (“the Third Office Action”);
- July 25, 2006 – Non-Final – (“the Fourth Office Action”); and
- December 27, 2006 – Non-Final – (“the Fifth Office Action”)

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(IV) Status of Amendments

The claim listing set forth in Section IX reflects the pending claims, which were presented by way of applicant's amendment under 37 CFR §1.111, which was submitted on May 3, 2006, concurrent with a Request for Continued Examination. Entry of these claims was confirmed by the Fourth Office Action dated July 25, 2006.

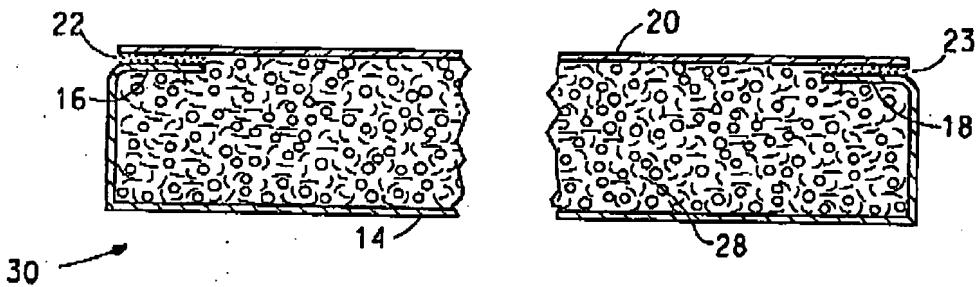
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(V) Summary of Claimed Subject Matter¹

Applicant's invention, as recited by appealed claims 1-6, 8-15, 17-27, and 29-32, as amended, is directed to a nonwoven, fibrous mat comprising chopped glass fibers having a relatively small range of average fiber diameters, and a gypsum board faced with such a mat. The particular combination of fiber diameter and length delineated by the appealed claims affords a surprising and unexpected smoothness, permitting the claimed gypsum board to be painted or otherwise given an aesthetically pleasing finish after installation, without the extensive further surface preparation required with previous fibrous mat faced boards. In various preferred embodiments, the mat has a high permeability, permitting easy extraction of excess water ordinarily present during slurry-based manufacture of gypsum or other hydraulic set board. In addition, the gypsum board may exhibit a combination of desirable structural and functional features that render it fire resistant.

Fig. 1 of the instant application depicts one embodiment of a gypsum board of the invention, and is reproduced below for convenience.



¹Page and line numbers in Section (V) refer to the specification as filed, unless otherwise noted.

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Fig. 1
(USSN 10/607,858)

A. Independent claims 1, 27, 29, and 32.

Independent claim 1 is directed to a gypsum board (Fig. 1, #30) having first and second faces (i.e., front and back large surfaces, page 6, line 29) and a set gypsum core (Fig. 1, #28). First and second facers (Fig. 1, #14, #20) are affixed to the first and second faces, respectively. Claim 1 requires that the first facer be a fibrous mat. (Claims 20 and 21, both dependent from claim 1, recite embodiments in which the second facer comprises kraft paper and fibrous mat, respectively.) In the preferred embodiment depicted by Fig. 1, mats 14 and 20 are both fibrous mats, with a small portion of mat 14 being folded over the lateral edges of board 30 to form strips 16 and 18. Second mat 20 covers the second face of gypsum core 28 and is preferably adhesively attached to strips 16 and 18. A similar configuration may be used for kraft paper or other second facers. Ordinarily, gypsum board 30 is used in building construction, wherein it is installed by attaching it to construction members, such as wall studs or ceiling joists, positioned such that mat 14 faces a finished space in a building. See page 6, line 34, through page 7, line 11.

At least one of the facers of board 30 is a fibrous mat comprising a non-woven, glass fiber web bonded together with a resinous binder (page 7, lines 15-18). The glass fibers of this mat (e.g., mat 14 of Fig. 1) consist essentially of chopped glass

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fibers having an average fiber diameter ranging from about 9.5 to 12.5 μm^2 (page 7, line 20; page 13, lines 9-11) and an average fiber length ranging from about 6 to 12 mm (page 8, line 29; original claim 7). Use of a non-woven glass fiber mat imparts a significant improvement in fire resistance over paper-faced gypsum boards.

Independent claim 27 recites, in Jepson form, an improved gypsum board having first and second faces and a non-woven fibrous mat affixed to at least one of the faces (page 6, lines 28-30). The mat comprises a glass fiber web bonded together with a resinous binder (page 7, lines 15-17). The chopped glass fibers of the mat consist essentially of glass fibers having an average fiber diameter ranging from about 9.5 to 12.5 μm (page 7, lines 17-20; page 13, lines 9-11) and an average fiber length ranging from about 6 to 12 mm (page 8, lines 28-29).

Independent claim 29 is a subcombination claim directed to a fibrous mat, such as that employed in the gypsum board of claim 1. Specifically, the fibrous mat of claim 29 comprises a non-woven glass fiber web bonded together with a resinous binder. The glass fibers of the web consist essentially of chopped glass fibers having an average fiber diameter ranging from about 9.5 to 12.5 μm and an average fiber length ranging from about 6 to 12 mm.

² It is to be noted that the 9.5 to 12.5 μm range is equivalent to $11 \pm 1.5 \mu\text{m}$, as set forth in the specification at page 7, line 20 and page 8, lines 28-29.

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Independent claim 32 delineates a hydraulic set board (page 6, lines 28-30) comprising a hydraulic set material layer having first and second faces. "Hydraulic set material" is expressly defined at page 6, lines 30-33:

By hydraulic set is meant a material capable of hardening to form a cementitious compound in the presence of water. Typical hydraulic set materials include gypsum, Portland cement, pozzolanic materials, and the like.

Like the gypsum board of claim 1, the hydraulic set board of claim 32 employs first and second facers affixed to the first and second faces. At least one of the facers is a fibrous mat comprising a non-woven, glass fiber web bonded together with a resinous binder (page 7, lines 15-18). The glass fibers of this mat (e.g., mat 14 of Fig. 1) consist essentially of chopped glass fibers having an average fiber diameter ranging from about 9.5 to 12.5 μm (page 7, line 20; page 13, lines 9-11) and an average fiber length ranging from about 6 to 12 mm (page 8, line 29; original claim 7).

Surprisingly and unexpectedly, gypsum and hydraulic set board faced with the present nonwoven glass fiber mat in accordance with the invention, wherein the fibers consist essentially of chopped glass fibers having an average fiber diameter ranging from about 9.5 to 12.5 μm and an average fiber length ranging from about 6 to 12 mm, has a smoother surface than boards made with mats employing either larger or smaller diameter fibers (page 7, lines 27-32).

The smooth surface of the claimed gypsum board permits it to be directly painted to achieve an aesthetically pleasing finish. While conventional paper-faced construction board products are also directly paintable, previous glass fiber mat faced board products are not. Instead, they need a plaster skim coating or like surface

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preparation (page 6, lines 8-11, compare page 4, lines 4-11 and 20-33). As a result of its smooth surface, the present gypsum or hydraulic set board is thus simpler to make and use than previous boards having glass fiber facers, that required extensive additional preparation steps to attain an acceptable surface finish. Without such preparation, even multiple coats of paint are insufficient to obscure the perceptible unevenness replicating the underlying roughness of the glass mat surface of prior art boards.

It is especially surprising and significant that the aforementioned 9.5 to 12.5 μm fibers result in smoother board than that obtained with fibers having a smaller diameter (page 8, lines 2-3). It is likewise surprising and unexpected that a gypsum board having a facer wherein the average glass fiber diameter is 9.5 – 12.5 μm and the average fiber length is 6 – 12 mm is smoother than board faced with mat having the same diameter but fiber length of 19 mm (3/4"). See the Declaration Under 37 CFR 1.132 of inventor Jaffee dated April 26, 2006 at §§15, 19.

B. Claims 2-6, 8-15, 17-19, 21-24, and 26 (dependent from base claim 1).

Claims 2-6, 8-15, 17-19, 21-24, and 26, which depend directly or indirectly from base claim 1, are directed to preferred embodiments of a gypsum board.

Claims 2-3 delineate preferred compositions of glass fiber used in the non-fibrous mat facer. Claim 2 recites a Markush group of preferred glass fiber materials (page 8, lines 15-17), while claim 3 calls for E-glass fibers (page 8, line 21).

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Claims 4-6 and 8 recite dimensional characteristics of preferred glass fibers used in the non-fibrous mat facer. Claims 4-6 respectively require that the chopped glass fibers have at least about 90%, 95%, and 97% by weight of fibers having a diameter ranging between about 9.5 and 12.5 μm (page 7, lines 17-20). Claim 8 calls for at least a majority of the chopped glass fibers to have a fiber length ranging from about 6 to 18 mm (page 7, lines 22-23).³

Claims 9-15 relate to the resinous binder used in the non-woven glass fiber mat. Claim 9 (dependent from claim 1) recites, in Markush form, a preferred resinous binder (page 8, line 31 through page 9, line 5), while claim 10 calls for a more preferred binder of modified acrylic latex (page 9, lines 25-27 and 33-34). Claim 11 (dependent from claim 9) further requires the presence of a cross linker in an amount ranging up to about 10 weight percent (page 9, line 30). Claims 12 and 13 (also dependent from claim 1) further call for about 2 to 5 weight percent of the cross linker and a melamine formaldehyde containing binder, respectively (page 9, lines 30-32). Claim 14 recites a preferred glass transition temperature ranging from about 15 to 45°C for the resinous binder (page 9, lines 7-8). Claim 15 requires the further presence of at least one water repellent agent in the binder (page 9, line 12).

Claims 17-19 respectively delineate preferred basis weights for the fibrous mat of about 0.6 to 2.2; about 0.9 to 2.2; and about 1.25 ± 0.2 , all measured in pounds per 100 square feet (page 10, lines 30-32).

³ It is noted that the 12 ± 6 mm recited at page 7, line 20, is equivalent to 6 to 18 mm.

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Claims 23-26 set forth preferred forms of the gypsum core. Claims 23-25 respectively call for the core to comprise at least one water repellent agent (page 13, line 18), reinforcing fiber (page 13, lines 15-16), and a biocide (page 13, line 17). Claim 26 calls for a board having flame resistance sufficient to pass the test of ASTM Method E84, Class 1 (page 10, lines 19-22).

C. Claims 30-31 (dependent from base claim 29).

Claims 30-31 are directed to preferred embodiments of a fibrous mat. Claim 30 calls for a mat wherein at least about 90% by weight of said chopped glass fibers have a diameter ranging between about 9.5 and 12.5 μm (compare claim 4). Claim 31 requires a mat having a permeability of at least about 300 cfm/ft² measured by the Frazier test (page 11, lines 26-31 and 34).

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(VI) Grounds of Rejection To Be Reviewed on Appeal

- (A) Whether claims 1-6, 8-15, 17-19, 21-24, 26-27, and 29-32 should be rejected under 35 U.S.C. §103(a) as being unpatentable over US Patent No. 5,772,846 to Jaffee.
- (B) Whether claim 20 should be rejected under 35 USC 103(a) as being unpatentable over Jaffee in view of US Patent 6,365,533 to Horner, Jr., et al.
- (C) Whether claim 25 should be rejected under 35 USC 103(a) as being unpatentable over Jaffee in view of US Patent 7,056,582 to Carbo.

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(VII) Arguments

A. The gypsum board of claims 1-6, 8-15, 17-19, 21-24, and 26-27; the fibrous mat of claims 29-31; and the hydraulic set board of claim 32 meet the conditions for patentability.

The Examiner has rejected claims 1-6, 8-15, 17-19, 21-24, 26, 27, and 29-32 under 35 USC §103(a) on the following basis:

Claims 1-6, 8-15, 17-19, 21-24, 26, 27, and 29-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 5,772,846 to Jaffee. The above mentioned claims remain rejected as substantially set forth in the Non-Final Rejection of July 25, 2006, section 3.

The Examiner's Non-Final Rejection of July 25, 2006 included an identical statement of rejection of these claims.

Jaffee provides a thermoformable nonwoven fibrous mat having properties said to make it particularly suited for a facer on insulating gypsum board. The mat is said to have improved handling characteristics, improved flame resistance, improved flexibility, and to produce less, or less irritating, dust when the faced gypsum board is cut than previous such boards. The mat includes textile glass fibers, which are defined as fibers having an average fiber diameter of about 5 microns or larger. See col. 2, lines 1-16.

Applicant respectfully submits that the gypsum board delineated by amended claims 1-6, 8-15, 17-19, 21-24, and 26-27; the fibrous mat recited by amended claims 29-31; and the hydraulic set board of amended claim 32 are not disclosed or

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suggested by Jaffee. While Jaffee admittedly discloses, in general terms, a nonwoven fibrous mat for use as a facer on gypsum insulating board, applicant maintains that Jaffee fails to disclose or suggest the particular mat recited by applicant, let alone a gypsum board faced with mat delineated by the foregoing claims, as amended. More specifically, Jaffee does not disclose or suggest any non-woven glass fiber mat wherein the glass fibers have an average diameter and an average fiber length falling within the ranges delineated by applicant's claims.

It is respectfully submitted that the basis set forth in the present Office Action is insufficient to establish *prima facie* obviousness of claims 1-6, 8-15, 17-19, 21-24, 26, 27, and 29-32. For the reasons set forth below, applicant maintains that the Jaffee reference, taken as a whole, fails to disclose or suggest every feature delineated by the rejected claims and that a person having ordinary skill in the construction board art would not find basis to carry out the substantial reconstruction of the Jaffee mat required to reach the subject matter set forth by the rejected claims.

1. Independent claims 1, 27, 29, and 32 meet the conditions for patentability because Jaffee does not disclose or suggest the gypsum board of claims 1 and 27; the fibrous mat of claim 29; or the hydraulic set board of claim 32.

a. Independent claims 1, 27, 29, and 32 meet the conditions for patentability because Jaffee does not disclose or suggest every feature of the gypsum board of claims 1 and 27; the fibrous mat of claim 29; or the hydraulic set board of claim 32.

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Pertaining to claims 1, 27, and 32, the July 25, 2006 Office Action states the following:

As to claims 1, 19 - 22, 27 and 32, Jaffee teaches a nonwoven fibrous mat for use as a facer on a gypsum insulating board (column 2, lines 1 - 15). Jaffee teaches that the mat comprises a major portion of textile glass fibers and a minor portion of polymer fibers (column 2, lines 50 - 60). Jaffee teaches that the nonwoven mat is bound together with a latex (column 2, lines 35 - 45). The Examiner equates the latex to Applicant's "resinous binder". Jaffee teaches that the glass fibers can have a length between 0.25 and 1 inch (column 3, lines 55 - 60); the Examiner equates this short length to Applicant's "chopped continuous fibers". Jaffee teaches that the glass fibers have an average diameter from about 9 microns to 20 microns (column 3, lines 35 - 40). Jaffee states that it is known to face a gypsum wall board with a fiber glass nonwoven mat as shown in US. Patent No. 4,647,496, the disclosure of which is hereby incorporated by reference.

Pertaining to claim 29, the July 25, 2006 Office Action states the following:

As to claim 29, Jaffee teaches a nonwoven fibrous mat for use as a facer on a gypsum insulating board (column 2, lines 1 - 15). Jaffee teaches that the mat comprises a major portion of textile glass fibers and a minor portion of polymer fibers (column 2, lines 50 - 60). Jaffee teaches that the nonwoven mat is bound together with a latex (column 2, lines 35 - 45). The Examiner equates the latex to Applicant's "resinous binder". Jaffee teaches that the glass fibers can have a length between 0.25 and 1 inch (column 3, lines 55 - 60); the Examiner equates this short length to Applicant's "chopped continuous fibers". Jaffee teaches that the glass fibers have an average diameter from about 9 microns to 20 microns (column 3, lines 35 - 40).

Appellant respectfully submits that Jaffee does not disclose any fibrous mat comprising a non-woven, glass fiber web, wherein the glass fibers consist essentially of chopped glass fibers having an average fiber diameter ranging from about 9.5 to 12.5 μm and an average fiber length ranging from about 6 to 12 mm.

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Clearly, the foregoing specific diameter and length ranges are nowhere to be found in Jaffee. Moreover, Jaffee discloses a mat that comprises a blend of fibers, namely a major portion of textile glass fibers and a minor portion of microfibers, which may be either glass or polymeric. See, e.g., col. 2, lines 10-16 and 37-40; and col. 3, lines 25-30.

Significantly, the only species of mat in Jaffee that does not include a minor portion of microfibers (either glass or polymeric) uses textile glass fiber that has a 16 μm diameter and a one inch length (Example 1, col. 4, line 67 through col. 5, line 1. The Example 1 mat is said to have an undesirably low strength (col. 5, lines 52-53). In every other Jaffee species, a portion of the fibers are either polymeric or glass (col. 9, line 1) microfibers.

At page 6, final paragraph, of the July 25, 2006 Office Action, the Examiner has acknowledged that Jaffee fails to disclose the average fiber diameter range and the average fiber length range recited by each of claims 1, 27, 29, and 32. However, in the subsequent December 27, 2006 Office Action, at page 8, lines 2-3, the Examiner reverses course and asserts that the claimed ranges of average fiber diameter and fiber length are "anticipated" by Jaffee.

In fact, the December 27, 2006 Office Action contains no less than fourteen (14) instances in which the Examiner uses the word "anticipates" or grammatical counterparts thereof in rejecting applicant's claims over Jaffee.⁴ However, as best understood by appellant, none of the pending claims is now rejected under any

⁴ Specifically, the terms "anticipates," "anticipation," or "is anticipated" are found at: page 4, line 19; page 5, line 3; page 7, lines 4 and 19; page 8, lines 3, 9, and 15; page 10, lines 3, 12, and 13; page 11, line 7; page 12, line 9; and page 13, lines 1 and 13.

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provision of 35 USC 102.⁵ Applicant respectfully disagrees in each instance that Jaffee "anticipates" the present claimed subject matter.

While the existence of a prior art species falling within a claimed generic range has been held to anticipate the claimed genus, in the present instance no species of Jaffee falls within the claimed ranges. None of the Jaffee species even has an average fiber diameter falling within the claimed range of about 9.5 to 12.5 μm . Even less does any species satisfy both the diameter and length claim features. Absent such an identified species, a case-specific factual analysis is legally required to establish possible anticipation. *Ex parte Cole*, 2001 WL 1918535 (BPAI, 2001), quoting *Ex parte Lee*, 31 USPQ2d 1105, 1107 (BPAI, 1993). Explaining the nature of the factual analysis, the Board of Patent Appeals and Interferences required a determination of the specificity of disclosure. [“Where, as here, a reference describes a class of compositions, the reference must be analyzed to determine whether it describes a composition(s) with sufficient specificity to constitute an anticipation under the statute. *Ex parte Lee*, supra, at 1106-1107, emphasis added, citing *In re Schaumann*, 572 F.2d 312, 197 USPQ 5 (CCPA 1978).]

Applicant is unable to locate any such analysis in any of the Office Actions in the instant matter. Moreover, it is respectfully submitted that the Examiner's own statement in an earlier Office action dated December 27, 2004 clearly establishes

⁵ This equivocation may reflect repetition of the Examiner's remarks in previous Office Actions dated December 27, 2004, August 15, 2005, and October 24, 2005. In each of those Office Actions, certain claims were rejected under 35 USC 102(b) as being anticipated by Jaffee, while other claims were rejected in the alternative under 35 USC 102(b) or 35 USC 103(a) over Jaffee.

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that the specificity required under *Lee* to predicate any rejection under 35 USC 102 is completely absent:

...although Jaffee does not teach with certain specificity of Applicant's desired range, it should be noted that Jaffee's range does overlap with Applicant's range" (Office Action of December 27, 2004 at page 5, lines 5-6, emphasis added).

Absent any proper basis for an anticipation rejection, the Examiner has apparently asserted *prima facie* obviousness based on the overlap of Jaffee's fiber diameter and length ranges with applicant's. Accordingly, the Examiner has stated that in the absence of unexpected results, it would have been obvious to optimize the fiber diameter, length, proportion of glass fibers, and basis weight, citing *In re Aller*, 220 F.2d 454, 105 USPQ 233 (CCPA 1955). It is said that one would have been motivated to optimize these characteristic in order to create a composite with the desired properties such as flexibility and strength while minimizing skin irritation during installation.

Appellant respectfully traverses these contentions, maintaining that Jaffee neither discloses nor suggests the gypsum board of claims 1 and 27, the hydraulic set board of claim 32, or the fibrous mat of claim 29.

As amended, claims 1, 27, 29, and 32 all recite a fibrous mat comprising a non-woven, glass fiber web bonded together with a resinous binder. The glass fibers of the web consist essentially of chopped glass fibers having an average fiber diameter ranging from about 9.5 to 12.5 μm and an average fiber length ranging from about 6 to 12 mm. While the ranges of average fiber diameter of 9 to 20 μm (and even the preferred 10 to 16 μm) and average fiber length of 0.25 to 1.0 inch disclosed by Jaffee

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overlap the corresponding ranges in applicant's claims, it is submitted that the presence of glass microfibers or polymer fibers also taught by Jaffee (see, e.g., col. 3, lines 42-46 and 48-53, respectively) is precluded by the transitional use of "consisting essentially of" in each of claims 1, 22, 27, 29, and 32. Applicant maintains that a person having ordinary skill in the pertinent art would recognize that the presence of glass microfibers or polymer fibers of the types disclosed by Jaffee would incontrovertibly affect the basic and novel characteristics of applicant's claimed mat and construction boards. Applicant further maintains that the presence of additional materially important constituents in the Jaffee mat obviates any finding that claims 1, 27, 29, and 32 are *prima facie* obvious over the foregoing disclosures of fiber blends by Jaffee. The Examiner has not articulated any motivation for a skilled person to avoid the blend of textile glass fibers and microfibers delineated by Jaffee.

The Examiner has disputed applicant's contention by giving a different meaning to the transitional term "consisting essentially of."

As first proposed in applicant's response dated October 10, 2005, that was subsequently entered in conjunction with the Request for Continued Examination dated May 3, 2006, claims 1, 22, 27, 29, and 32 were all amended by replacement of the phrase "composed of" used in the original filing by "consisting essentially of." This amendment was done for the sake of clarity, and in view of the Office Action of August 15, 2005 that had stated that, in accordance with MPEP 2111.03, the phrase "composed of" could be construed to mean either "consisting of" or "consisting essentially of." Accordingly, these claims were amended to expressly adopt the latter meaning.

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Applicant's October 10, 2005 response included the following:

In the present instance, it is submitted that the specification, when read as a whole by a person of ordinary skill in the art, and as inferred by the Examiner, would clearly indicate that the latter meaning [*i.e.*, "consisting essentially of"] is intended. For example, applicant respectfully points to: (i) the recitation of the Field of the Invention at page 1, lines 8-9, of a glass fiber mat employing fibers having "a narrow range of diameters" used in producing gypsum board; (ii) the narrow range of diameters of fibers in preferred mats delineated at page 7, lines 17-20; and (iii) the benefits of a narrow range of diameters set forth at page 7, lines 27-32.

Applicant respectfully submits that the replacement of the term "composed of" with the partially closed transitional phrase "consisting essentially of" in claims 1, 22, 27, 29, and 32 clearly signaled the understanding of claim scope applicant intended from the beginning, in accord with firmly established Patent Office practice. Applicant has employed the transitional phrase "consisting essentially of" in a manner that is consistent with the meaning delineated in MPEP §2111.03, which quotes *In re Herz*, 537 F.2d 549, 551-52, 190 USPQ 461, 463 (CCPA 1976), that was also cited by the Examiner. Such usage, articulated long ago in *Ex parte Davis*, 80 USPQ 448, 450 (Pat. Off. Bd. App. 1948), has since been repeatedly affirmed. See, e.g., *AK Steel Corp. v. Sollac*, 344 F.3d 1234, 1239, 68 USPQ2d 1280 (Fed. Cir. 2003).

Applicant respectfully submits that the specification and file history of the present application provide sufficient basis for clearly understanding the ambit of the present claims. That is to say, the specification recites basic and novel characteristics of the claimed fibrous mat and gypsum board made therewith. Embodiments including elements whose presence would materially affect the basic and novel characteristics of the mat would be outside the scope of the claim, and thus excluded by use of the "consisting essentially of" transitional phrase.

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Notwithstanding applicant's remarks, the Examiner has continued to discount the use of the transitional phrase "consisting essentially of" as follows:

In regards to the transitional phrase "consisting essentially of," the phrase limits the scope of a claim to the specified materials or steps "and those that do not materially affect the basic and novel characteristic(s)" of the claimed invention. *In re Herz*, 537 F.2d 551-552, 190 USPQ 461, 463 (CCPA 1976). The burden is upon the applicant to show that the additional components do not affect the basic and novel characteristics of the invention. For the purposes of searching for and applying prior art under 35 U.S.C. 102 and 103, absent a clear indication in the specification or claims of what the basic and novel characteristics actually are, "consisting essentially of" will be construed as equivalent to "comprising." See, e.g., PPG, 156 F.3d at 1355, 48 USPQ2d at 1355. See MPEP 2111.03. (Office Action of July 25, 2006, page 3, line 17 *et seq.*)

Based on adoption of the "comprising" meaning, the Examiner has asserted that glass fiber formulations of Jaffee which include certain microfibers and polyester fibers are not excluded by the scope of applicant's claims.

In the present instance, it is submitted that the specification, when read as a whole by a person of ordinary skill in the art would clearly indicate the subject matter intended. For example, applicant respectfully points to: (i) the recitation of the Field of the Invention at page 1, lines 8-9, of a glass fiber mat employing fibers having "a narrow range of diameters" used in producing gypsum board; (ii) the narrow range of diameters of fibers in preferred mats delineated at page 7, lines 17-20; and (iii) the benefits of a narrow range of diameters set forth at page 7, lines 27-32. Applicant maintains it would be unreasonable to construe a "narrow range of diameters" in any manner that would encompass a blend of microfibers having diameters of below 5 microns (Jaffee, col. 3, line 27), let alone 0.4 – 2 microns (col. 3, line 44), and base fibers 9 – 20 microns in diameter (Jaffee, col. 3, lines 35-39). It would be equally

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unreasonable to presume that Jaffee would have intentionally replaced as much as 10 wt.% (col. 6, line 67 to col. 7, line 1) or 15 wt.% (col. 5, line 47) of base fibers with microfibers without having contemplated a material effect on mat properties. The additional cost and complexity of producing such a multi-component mat would surely have discouraged Jaffee away, were there not properties that were enhanced by the presence of microfibers.

Attention is further drawn to the instant specification at page 7, lines 23-26, wherein it is observed that a person having ordinary skill in the glass fiber art would recognize that in a chopped fiber product, there are commonly present a small fraction of fibers broken into two or more pieces and a very small fraction of small glass fibers and chips. Such constituents would clearly be within the scope of a claim delineated using "consisting essentially of."

The properties of applicant's mat are even further elucidated in the specification at page 11, line 19, *et seq.*, which discloses the role of a relatively high air permeability in promoting the extraction of water present in the gypsum slurry through the present mat during formation of gypsum board. Water extraction is implicit in drying step (d) of withdrawn process claim 28. Preferred embodiments having high air permeability and high flame resistance are delineated by claims 31 and 26, respectively. The value of high mat strength is recognized, e.g. at page 11, lines 14 - 17 and in the strength data of Table III (page 16)

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Applicant thus maintains the Examiner has erred by failing to take cognizance of the foregoing teachings as indicating basic and novel characteristics of the present claimed mat and construction boards.

The Examiner has asserted that under *Herz*, the burden is on applicant/appellant to show that the additional components disclosed by Jaffee do not materially affect the basis and novel characteristics of the claimed invention, and in searching and applying prior art, has regarded "consisting essentially of" as being equivalent to "comprising."

Examiner respectfully disagrees with Applicant's interpretation of the transitional phrase "consisting essentially of." While Applicant appears to have set forth the components of the invention and ranges which may be essential to the invention, Applicant has not met the burden of showing that the additional components do affect the basic and novel characteristics of the invention. Applicant has only set forth those characteristics that Applicant believes would be materially affected by the presence of elements in an embodiment that would be outside the scope of the claim without showing how those characteristics would be materially affected by additional components, which are the polymer fibers in Jaffee. In other words, Applicant has not shown that the polymer fibers affect the basic and novel characteristics of the invention. Therefore, since Applicant has not appeared to meet the burden aforementioned, for purpose of searching for and applying prior art under 35 U.S.C. 102 and 103, "consisting essentially of will be construed as equivalent to "comprising." The presence of polymer fibers in Jaffee does not distinguish Jaffee from Applicant's claimed invention "comprising." (Office Action of December 27, 2006, page 3, paragraph 2.)

The Examiner has thus contended that it has not been established that the presence of a minor proportion of glass microfibers or polymer fibers affects applicant's claimed mat. To the contrary, applicant maintains this argument is doubly flawed: (i) the Jaffee reference itself establishes the material effect of the subject glass microfibers or polymer fibers; and (ii) the very arguments the Examiner has asserted in

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connection with his rejection of dependent claim 31 (see Section VII.A.3.b below) are inconsistent with, and refutative of, his position with respect to claims 1, 27, 29, and 32.

Jaffee specifically associates a number of characteristics pertinent to a gypsum board with the inclusion of glass or polymer microfibers in his mat. At col. 1, lines 27-28, mat made exclusively with textile glass fibers in accordance with US Patent No. 4,647,496 to Lehnert was said to have undesirably low strength, which problem was ameliorated by the substitution of a small portion of PET fibers (lines 39-41) and use of an acrylic binder with stearylated melamine (lines 42-43). While this mat was stronger, it was also less flame resistant (line 48). Lowered flame resistance of certain of Jaffee's mats is expressly attributed to the replacement of base glass fiber by polyester microfiber (first footnote to the Jaffee table, at col. 6, line 40 *et seq.*). On the other hand, the flame resistance of preferred embodiments of the present mat is recited by claim 26.

Jaffee also regards microfiber inclusion as beneficial and important for filtration media. See col. 3, lines 25-29 and 42-50. Significantly, the presence of small fibers is said "to produce a mat having very small windows formed by the randomly arrayed fibers to catch very fine particles" (lines 44-46). Applicant maintains a skilled artisan would recognize this teaching as being directly pertinent to applicant's air permeability. In particular, a skilled person would regard the touted "small windows" as highly likely to decrease the air permeability of the prior-art Jaffee mat drastically over comparable mat made with only base textile glass fibers, especially fibers with a

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narrow range of diameters, since an extended range of fiber sizes would reasonably be expected to cause a denser areal filing of the mat. Although possibly beneficial for filtration, such a decrease in permeability would adversely affect the functioning of the mat as a gypsum board facer, e.g. for the reasons set forth in the specification at page 11, lines 20-26.

Applicant therefore maintains that the Jaffee reference itself establishes that addition of certain microfibers affects properties that are material to properties of applicant's mat, as recited in claim 29 and as used in the gypsum board recited by claims 1, 27, and 32.

Second, applicant maintains that the Examiner has taken a position pertinent to the interpretation of applicant's phrase "consisting essentially of" in claims 1, 27, 29, and 32, that directly contradicts his position on claim 31.

As discussed in more detail in Section VII.A.3.b, applicant first responded to the rejection of claim 31 in the Office Action of August 15, 2005 by referring to US Patent 4,637,951 to Gill, which discloses a fibrous glass mat that includes a majority of base fibers having a mean diameter in the range of 10 microns with a minor amount of microfibers. Applicant has repeated this argument in subsequent responses. The Examiner has acknowledged that Gill (col. 3, lines 26-30) defines "microfiber" as referring to fibrous materials having a mean diameter in the neighborhood of one micron. See Office Action of December 27, 2006, at page 10, lines 18-21. Applicant cited Gill particularly for its disclosure concerning air permeability of certain fibrous mats. On the other hand, Jaffee also discloses mats in which the minor portion can be

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either: (i) glass microfibers having average fiber diameter of 0.4 – 2 microns (col. 3, lines 43-45); or (ii) microdenier synthetic polymer fibers (col. 3, lines 48-50). (The Examiner apparently recognizes disclosure of the latter fiber type, but not the former. See Office Action of December 27, 2006, at page 10, lines 15-18.) Both these additions are said by Jaffee to render mat suitable for use as an air filtration medium. See col. 3, Lines 41-43 and 46-48, respectively. Both fiber types also satisfy Gill's "neighborhood of one micron" criterion.

Significantly, the Examiner has interpreted applicant's remarks concerning Gill and Jaffee as establishing that mat made with a minor portion of microdenier polymer fibers, but not microfibers, results in certain values of air permeability. See Office Action of December 27, 2006, at page 11, lines 1-2. Whether or not the Examiner's purported distinction between glass and polymer microfibers is valid,⁶ applicant nonetheless maintains that by making this distinction, the Examiner has expressly adopted a position regarding claim 31 that is logically incompatible with the position he has taken in considering claims 1, 27, 29, and 32. That is to say, he has recognized and admitted that a skilled artisan in possession of the Jaffee and Gill prior art references would recognize that the inclusion of microfibers of at least certain types fibers having diameters outside the claimed 9.5 – 12.5 μm range results in an alteration of a claimed (see at least claim 31) physical property of applicant's mat, whereas other fiber types of the same diameter do not have this effect. It is respectfully submitted

⁶ Applicant maintains that Jaffee does not support the Examiner's purported distinction between glass and polymer microfibers. See col. 3, lines 25-30, wherein Jaffee teaches use of either glass or polymer microfibers for air filtration mats: "When the mat of the present invention is to be used as a material to make filter media, glass or synthetic polymer microfibers having average fiber diameters below 5 microns to provide high efficiency filtration for very fine particles, bacteria, etc."

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that the foregoing admission and assertion of the Examiner cannot be reconciled with the position he has taken with respect to applicant's use of "consisting essentially of." That is to say, the Examiner cannot at once maintain that a person having ordinary skill and in possession of the present specification would regard microfibers as having no material effect on the characteristics of the mat of claims 1, 27, 29, and 31, while later asserting that some, but not all, microfibers do affect air permeability, e.g. as delineated by claim 31.

Appellant thus maintain that either of these reasons is sufficient to negate the Examiner's proposed equation of the transitional phrase "consisting essentially of" in claims 1, 27, 29, and 31 with "comprising."

- b. Independent claims 1, 27, 29, and 32 meet the conditions for patentability because the gypsum board of claims 1 and 29, the fibrous mat of claim 27, and the hydraulic set board of claim 32 exhibit properties that are surprising and unexpected, predicating their patentability.

Gypsum or hydraulic set construction board faced with applicant's mat has been shown to have a surface that is smoother than that of boards faced with prior art non-woven glass fiber mat. As set forth in the specification and as discussed above, the desirable "hand" of the present mat and board permits easy application of surface finishes (such as paint) directly to installed board without extensive surface preparation (page 8, lines 5-14 and page 7, lines 11-14). The elimination of this surface

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preparation, such as the application of a plaster skim coat, fills a long-standing need in the art by making installation and use of the board more efficient and economical. Such benefits are surprisingly absent from boards made from fibers having diameters falling within other narrow ranges that are outside those required by applicant's claims. Only in light of applicant's own disclosure is it recognized that a directly paintable, non-woven glass fiber mat faced gypsum board could even be produced (specification at page 8, lines 5-14).

Applicant maintains it is especially surprising and unexpected from the prior art that such a result could have been attained with a mat facer that employs glass fiber having a narrow range of diameters, and, *a fortiori*, that the smallest glass fibers do not provide higher smoothness, contrary to the expectation of the prior art (specification at page 8, lines 2-4).

These surprising and unexpected results are taught in the specification, and have been confirmed by way of two Declarations Under 37 CFR 1.132 submitted by inventor Jaffee and dated April 26, 2006 (hereinafter, "Declaration I") and October 23, 2006 ("Declaration II").

Notwithstanding applicant's disclosure in the specification and Rule 132 Declarations I and II and the aforementioned case law, the Examiner has continued to discount applicant's evidence as being insufficient to establish that the present claimed subject matter is surprising and unexpected. The Examiner has provided no evidence to the contrary.

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Applicant, on the other hand, maintains that the comparative data provided in the specification and in the Jaffee Declarations suffice, whether taken singly or in any combination, to establish the patentability of applicant's claimed subject matter. The unexpected smoothness of applicant's mat and board faced therewith is submitted to overcome any possible *prima facie* obviousness over Jaffee, all the more in further combination with properties afforded by preferred embodiments, including, *inter alia*, the high permeability of the mat permitting easy extraction of excess water present in the gypsum slurry during board fabrication (claim 31 and specification at page 11, lines 19-34) and flame resistance (claim 26 and specification at page 10, lines 19-22).

Applicant's findings were characterized from the outset in the specification as surprising and unexpected. See the specification at page 7, lines 27-32:

However, it is surprising and unexpected that gypsum board produced using mat formed with fibers having a diameter within a narrow range centered at about 11 μm is considerably smoother than board faced with mats wherein the fibers have a narrow range of diameters centered about 16, 15, 13, 8, and 5 μm , and smoother than other fiber-faced gypsum boards known in the art.

By way of contrast, Jaffee fails to recognize any of these benefits. It is respectfully submitted that the presence of these advantageous benefits, including *inter alia* both smoothness and the provision of directly paintable, glass-fiber mat faced gypsum board, which would not otherwise be obtained without using applicant's fiber, provides ample basis for predicating patentability of applicant's claims over Jaffee, under the standard of *In re Geisler*, 116 F.3d at 1465, 1470, 43 USPQ2d at 1362, 1365 (Fed. Cir. 1997). ["The court in *Soni* summed up the rule of that case as follows:

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[W]hen an applicant demonstrates *substantially* improved results, as Soni did here, and states that the results were *unexpected*, this should suffice to establish unexpected results *in the absence of* evidence to the contrary.' citing *In re Soni*, 34 USPQ 2d 1684, 1688 (Fed. Cir. 1995)." Emphases in the original.] Applicant's disclosure is submitted to be substantial, surprising, and unexpected, because the improved smoothness of the mat permits manufacture of directly paintable gypsum board, heretofore unattainable.

Applicant further submits that the ability to directly paint the present gypsum board, without extensive post-installation surface preparation, establishes that the smoothness is a difference in kind, not just in degree, and so cannot properly be regarded as merely an optimization of any of Jaffee's ranges. The Examiner's reliance on *In re Aller*, 105 USPQ 233 is accordingly submitted to be misplaced. Absent any expectation that selection of a different diameter range would permit this painting, a skilled artisan would have no guidance or motivation on which to base the optimization contemplated in *Aller*. Further, applicant's data demonstrating that selection of both diameter and length is required to provide the present smoothness it is submitted that the need to select values of a plurality of variables in the present instance geometrically increases the complexity of any selection process, further distinguishing *Aller*.

Applicant respectfully maintains that the data set forth in the specification as Comparative Example 1 and Examples 2-5 provide a direct comparison of the smoothness of: (i) gypsum board faced with a non-woven glass fiber mat in accordance with the present invention and (ii) board faced with non-woven glass fiber mats having average diameter outside the claimed diameter range.

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In particular, attention is respectfully drawn to Example 5, beginning on page 16 of the specification. The properties of gypsum boards constructed with the non-woven fibrous mats prepared in Examples 2-4 are compared with gypsum board constructed with the prior art mat of Comparative Example 1, which employs fibers having an average diameter of 13 μm , a value clearly within the 9 – 20 μm range delineated by Jaffee. As set forth at page 17, lines 7-15, the Example 2-4 boards have a smoothness rating of 8, whereas the Comparative Example 1 board has a smoothness of only 4. It is submitted that these data clearly demonstrate the unexpected and surprising smoothness of gypsum board prepared using mat facers having the particular fibers required by applicant's claims. Absent any evidence to the contrary adduced by the Examiner, applicant maintains that the requirements of *Soni* and *Geisler, supra*, are satisfied, obviating any need for further evidence.

However, the specification also compares the claimed gypsum board with boards made with still other mats. At page 7, lines 15-32, applicant teaches that board faced with a fibrous mat employing glass fibers having a diameter within a narrow range centered at 11 μm is considerably smoother than boards faced with mat wherein the glass fibers have a diameter within a narrow range centered at values larger or smaller than 11 μm , viz. diameters of 16, 15, 13, 8, and 5 μm . All these diameters are within the ranges disclosed by Jaffee, which discloses textile glass fibers as being as small as 5 μm (see, e.g., col. 2, lines 12 and 14-15) and as large as 20 μm (col. 3, line 39).

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Further evidence pertinent to board smoothness is provided by Rule 132 Declarations I and II submitted by inventor Jaffee. However, the Examiner has deemed them insufficient.

In the Office Action of August 15, 2005, the Examiner disputed applicant's contention that the smoothness of the claimed mat and boards was surprising and unexpected, although no factual basis to rebut the aforementioned teaching of the specification was provided. The Examiner suggested submission of a declaration to substantiate these statements.

Applicant therefore submitted Declaration I pertaining to the smoothness of certain additional gypsum board samples. Declaration I supplemented the qualitative smoothness data in the specification with quantitative smoothness data taken with an optical scattering technique (§11-14). These data confirmed quantitatively that a sample having an average fiber diameter of 11 µm and an average fiber length of 12 mm was markedly smoother than samples having average fiber diameters of 8 or 13 µm (outside the claim 1 range) and smoother than a sample having an average fiber diameter of 11 µm but an average fiber length of 12 mm (outside the claim 1 range) (§15). Mr. Jaffee averred that the optical data were corroborative of the qualitative data set forth in the patent specification (§17).

Declarant/Inventor Jaffee further averred that for a person having ordinary skill in the glass fiber mat art on or before June 23, 2003, it would have been surprising and unexpected that a non-woven mat comprised of glass fiber having an average fiber diameter of 11 µm would produce gypsum board having a higher smoothness than

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boards made with mats having average fiber diameters of 13 and 8 μm . Instead, such a skilled artisan would have inferred that the smoothest surface would result from fabricating gypsum board with mat having the smallest fiber diameter (§18). Mr. Jaffee also averred that such a skilled artisan would have regarded that glass fiber mat made with fiber having an average fiber length of 6 to 12 mm (1/4 to 1/2 inch) would be highly likely to have lower tensile and tear strengths than mat made of glass fiber having the same average diameter but a fiber length of about 19 mm (3/4 inch). Lower tensile and tear strengths would have been known to be undesirable for mat to be used in the production of gypsum board (§§19-22). It is thus submitted that a skilled artisan would have had no motivation to modify the Jaffee species having one inch (25 mm) fiber to comply with applicant's 6-12 mm range.

The Office Action dated July 25, 2006 dismissed both the evidence in the specification and that provided by Declaration I. With respect to the former, the Examiner stated:

The Examiner does agree that the Specification asserts unexpected results but has failed to fully substantiate the assertion with evidence. In the Specification, the Applicant did not fully disclose the details of the experiments. In particular, the Applicant did not disclose the length of the fibers, the percentage of fibers and the amount of binder used in Examples 2 – 4 so a fair comparison cannot be made between the inventive examples and the conventional example. (page 9 of the Office Action dated July 25, 2006, page 9, last paragraph.)

With respect to Declaration I, the Examiner stated:

...it should be noted that "to establish unexpected results over a claimed range, applicants should compare a sufficient number of tests both inside and outside the claimed range to show the criticality of the claimed range. *In re Hill*, 284 F.2d 955, 128 USPQ 197 (CCPA 1960). Furthermore, whether the unexpected results are the result of unexpectedly improved results or a property not taught by the prior art, the "objective evidence of nonobviousness must be commensurate in

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scope with the claims which the evidence is offered to support." In other words, the showing of unexpected results must be reviewed to see if the results occur over the entire claimed range. *In re Clemens*, 622 F.2d 1029, 1036, 206 USPQ 289, 296 (CCPA 1980). The Examiner submits that the Applicant has not provided enough Samples to demonstrate that the unexpected results occur over the entire claimed range and would not occur in the broader range disclosed by Jaffee. The Applicant has only provided one sample which meets Applicant's diameter and length ranges and one sample which is outside Applicant's diameter and length ranges. Furthermore, the Applicant has not determined a trend in the exemplified data which would allow the artisan to reasonably extend the probative value thereof. The Declaration is not persuasive. ((Office Action of July 25, 2006, page 10, line 10. Emphasis in the original.)

Applicant maintains the position set forth in the response dated October 24, 2006, traversing the contention that the specification's teaching was inadequate to permit the comparison to be made. In particular, it is submitted that 35 USC 112 requires only that sufficient detail be provided to enable a person skilled in the art to make and use the disclosed invention. As a result, applicant maintains that the description of the examples is, in fact, sufficient to permit the comparison suggested by the Examiner. ("A patent is not a scientific treatise, but a document that presumes a readership skilled in the field of the invention." *Ajinomoto Co., Inc. v. Archer-Daniels-Midland Co.*, 228 F.3d 1338, 56 USPQ2d 1332, 1338 (Fed. Cir. 2000)).

However, to expedite prosecution, Declaration II was submitted, *inter alia* providing details of the fiber lengths of glass fibers used to make certain of the mats employed in the specification examples. It is respectfully submitted that in combination, the specification and Declaration II are sufficient to permit a skilled person to conclude that the smoothness of applicant's claimed gypsum board employing mat made with glass fibers having an average diameter ranging from about 9.5 to 12.5

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μm and an average length ranging from 6 to 12 mm is a surprising and unexpected result on which patentability is properly predicated.

More specifically, Declaration II established that the glass fiber used to prepare the mats of Examples 2-4, e.g. as delineated by Table III, were chopped glass fiber having an average fiber diameter of 11 μm and an average fiber length of 12 mm (§§5-6), which dimensions fall within the numerical ranges recited in claims 1, 22, 27, 29, and 32, as amended. The Declaration further established dimensions of the glass fiber used to make the mats delineated at page 7, lines 29-32 of the specification. In particular, the glass fibers having fiber diameters within narrow ranges centered at about 26, 15, 13, and 8 μm were chopped glass fibers having fiber lengths of about 25, 25, 19, and 6 mm, respectively (§7). None of these diameters is within the about 9.5-12.5 μm diameter range, and only the 6 mm length is within the about 6-12 mm length range. The glass fiber having fiber diameter within a narrow range centered at about 5 μm was flame attenuated glass fiber, for which the fibers have an extended range of fiber length (§8). The 5 μm diameter is also not within applicant's claimed numerical diameter range. Accordingly, it is submitted that Examples 2-4 of the specification employed non-woven glass fiber mats made of glass fiber having average fiber diameter and length within the range delineated by claims 1, 22, 27, 29, and 32, while all the comparative examples had at least one of average fiber diameter and length that did not fall within the aforesaid numerical ranges.

Declaration I is further submitted to establish that the enhanced smoothness of the 11 μm faced board is surprising and unexpected for a person having

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ordinary skill in the art, who would have expected, to the contrary, that the board made with mat having the smallest fibers, i.e. the 8 μm average fibers, would have been smoother than board made with 11 and 13 μm mat. Also established is that a person having ordinary skill in the art would not be motivated to use shorter fibers (e.g., fibers having an average length ranging from about 6 to 12 mm) instead of fibers 19 mm (3/4") or longer because of concern about required tensile and tear strengths associated with facing gypsum board.

Nevertheless, the Examiner has reiterated the assertion that the data are insufficient to establish the smoothness of applicant's faced gypsum board as surprising and unexpected.

The Examiner has taken cognizance of Declaration I, but has discounted it as not persuasive. See Office Action of December 27, 2006, at page 4, second paragraph. Declaration I provided smoothness data obtained using image processing software to analyze the appearance of the board surface when illuminated by ordinary light at grazing incidence. The Examiner has recognized, for example, that gypsum board faced with non-woven glass fiber mat having an average diameter of 11 μm (clearly within applicant's 9.5 – 12.5 μm range) is demonstrably smoother than board faced with 8 and 13 μm fiber mats (just outside the claimed limits). The Declaration data also demonstrate that gypsum board faced with mat wherein the glass fibers have an average diameter of 11 μm and an average fiber length of 12 mm is smoother than board faced with a mat having glass fibers of a similar diameter but average fiber length of 19 mm (3/4").

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The Examiner has countered that Declaration I is insufficient to establish patentability, asserting that an inadequate number of tests were provided. Applicant submits that what constitutes a "sufficient number" under *Hill* must be determined on a case-by-case basis from the perspective of a person having ordinary skill in the art. Applicant maintains that the number of tests provided by the Declaration data, especially in combination with the data already provided by the specification, is sufficient, given the relatively narrow ranges delineated by amended claims 1, 22, 27, 29, and 32.

Applicant respectfully traverses the contention that only one sample meeting the claimed diameter and length ranges and one sample outside those ranges is provided in Declaration I. While applicant agrees that of the samples in that Declaration, only Sample 2 is within the claimed diameter and length range, he nevertheless maintains that Samples 1, 3, and 4 are all outside the numerical limits of the ranges. The Examiner has correctly acknowledged that Sample 1 is outside both ranges, Sample 3 is outside the diameter range but inside the length range, and Sample 4 is inside the diameter range but outside the length range. It is respectfully submitted that all of Samples 1, 3, and 4 must thus be regarded as being outside the combination of ranges delineated by applicant's claims, and not just Sample 1.

Attention is further drawn to the Examiner's contention (Office Action of July 25, 2006, page 10, last line *et seq.*) that "the Applicant has not determined a trend in the exemplified data which would allow the artisan to reasonably extend the probative value thereof... [so that] The declaration is not persuasive." Applicant

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maintains that he is not required to provide the sort of comprehensive scientific explanation and theory the Examiner has apparently contemplated. And to the contrary, it is submitted that a sufficient trend is in fact seen, a trend that only confirms the teaching of the patent specification, that it is surprising and unexpected that diameters higher or lower than the claimed range produce less smooth mat and board. See, e.g., page 7, lines 27-32.

In further contradistinction to the Examiner's conclusion, a person having ordinary skill in the art, and knowing the comparative smoothness of gypsum boards having mats made with fiber having average diameter of 16, 15, 13, 8, and 5 μm , would have inferred an incorrect trend, that would have led a skilled artisan away from what applicant discovered. That is to say, one having ordinary skill in the art would have concluded that it was not possible to make a gypsum board smooth enough for direct painting. The artisan would have had no motivation to consider an intermediate average diameter (e.g., 11 μm), and no basis for any reasonable expectation of success, let alone any relative certainty, that such a board made with mat employing an intermediate average fiber diameter (e.g. 11 μm), would have the decidedly superior properties applicant has discovered.

It is submitted that the ruling of the Federal Circuit in *Fromson v. Anitec Printing Plates, Inc.*, 132 F.3d 1437, 45 USPQ2d 1269, 1276 (1997), *cert. denied*, 525 U.S. 817 (1998), is particularly apposite the present issue. The Court held as follows:

That an inventor has probed the strengths and weaknesses of the prior art and discovered an improvement that escaped those who came before is indicative of unobviousness, not obviousness. The district court did not correctly apply the law of obviousness, for there is no suggestion or

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teaching in the prior art to select from the various known procedures and combine specific steps, along with a new electrical structure, in the way that is described and claimed by Fromson.

Applicant respectfully submits that the discovery of the present length and diameter ranges is precisely the sort of improvement that escaped previous workers, as contemplated in *Fromson*, strongly predicating the non-obviousness of the discovery delineated by independent claims 1, 27, 29, and 32, as amended, along with the claims dependent thereon.

While applicant acknowledges the need for a "sufficient" number of tests, it is respectfully submitted that the number required to establish criticality must be determined on a case-by-case analysis. Even a single test within a range has been deemed adequate in some instances. *Ex parte Winters*, 11 USPQ2D, 1387, 1387 (BPAI, 1989). See also *In re Kollman*, 595 F.2d 48, 56; 201 USPQ 193 (CCPA 1979), holding that "Often, one having ordinary skill in the art may be able to ascertain a trend in the exemplified data which would allow him to reasonably extend the probative value thereof. The proof, thus considered, might then be sufficient to refute a PTO holding of *prima facie obviousness*." In the present instance, it is submitted that the unexpected finding of smoother mat surface at 11 μm than at flanking values of 8 and 13 μm permits a person having ordinary skill in the art to draw just such a conclusion.

In *Aller*, the court elucidated the concept of criticality in the context of ranges:

Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art. Such ranges are termed 'critical' ranges, and the

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applicant has the burden of proving such criticality. *In re Aller*, 220 F.2d 454, 456; 105 USPQ 233, 235, (CCPA 1955, citations omitted).

In the present instance, applicant maintains that a smoothness sufficient to permit a fibrous mat faced gypsum board to be painted satisfactorily, without skim coating or other post-installation surface finishing, differentiates the present mat and gypsum board in kind, not in degree, from previous gypsum boards and mats lacking this characteristic. It is further submitted that the tests presented in the present instance are sufficient to establish this criticality. At a very minimum, it is clear that applicant's data, both in the specification and in the Declarations, establish that at least some gypsum boards made within Jaffee's ranges of fiber diameter and length, are less smooth than applicant's gypsum board and thus fail to exhibit satisfactory paintability.

Applicant further disputes the Examiner's contention that the comparison of the samples is inconclusive as to whether the average fiber length has any effect on the smoothness of the mat. It is respectfully submitted that the Examiner has erred by considering the present data only in isolation, whereas it is settled law that the entirety of the record must be considered. *In re Rinehart*, 531 F.2d 1048, 1052; 189 USPQ 143 (CCPA 1976) (holding that "When prima facie obviousness is established and evidence is submitted in rebuttal, the decision-maker must start over. Though the burden of going forward to rebut the prima facie case remains with the applicant, the question of whether that burden has been successfully carried requires that the entire path to decision be retraced.") The Examiner's doubt whether average fiber length has any effect on smoothness is rebutted by comparison of Samples 2 and 4 of Declaration I,

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§15, which both have 11 μm diameter fibers, but 12 vs. 19 mm. length. However, one can reasonably conclude that length alone is insufficient to predict smoothness, because of the samples set forth in the specification at page 7, lines 28-32. Were length alone dispositive, the 8 μm diameter, 6 mm long fiber sample (outside the claimed diameter range) would have been smoothest, even in comparison to the 11 μm diameter, 12 mm long fiber sample (inside both the claimed diameter and length ranges).

Applicant also traverses the following Examiner's statement of the Jaffee disclosure concerning average fiber diameter:

The Jaffee reference sets forth an average diameter range of the glass fibers from about 9 microns to about 20 microns, preferably 10 microns to about 16 microns, which anticipates the claimed range. (Office Action of December 27, 2006, page 4, penultimate paragraph.)

While applicant agrees that Jaffee discloses 9 to 20 and 10 to 16 microns as preferred ranges, Jaffee also discloses fibrous mats employing glass fibers with diameters as low as 5 μm . See col. 2, line 16. It is submitted Jaffee's 5 μm disclosure negates the following contention of the Examiner:

Applicant argues that the May 3, 2006, Declaration is further submitted to establish that the enhanced smoothness for the 11 μm faced board is surprising and unexpected for a person having ordinary skill in the art, who would have expected, to the contrary, that the board with mat having the smallest fibers would have been smoother than board made with 11 and 13 μm mat. However, *this appears to support Examiner's contention regarding the anticipation of the range by the prior.* If one of ordinary skill in the art would have predicted that the board with the smallest fibers would be smoother than the board made with larger fibers, than one of ordinary skill in the art would have expected that the lower range of fibers capable of use in the invention would be smoother. (Office Action of December 27, 2006, page 4, penultimate line *et seq.*, emphasis added)

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Applicant respectfully maintains that the Examiner's exclusion of the 5 μm teaching in favor of a 9 μm lower limit reflects the arbitrary imposition of hindsight and blunts any suggestion that the lower end of Jaffee's 9-20 μm range would be logically selected by a skilled artisan seeking to enhance smoothness. There is no evidence that had smoothness been a criterion or object, Jaffee would have recognized a 9 μm lower limit.

c. Independent claims 1, 27, 29, and 32 meet the conditions for patentability because the gypsum board of claims 1 and 29, the fibrous mat of claim 27, and the hydraulic set board of claim 32 employ a non-woven fibrous mat that is not an obvious extension of any mat disclosed, suggested, or obvious to try in light of Jaffee.

In *KSR v. Teleflex*, 127 S. Ct. 1727 (2007), the Supreme Court recently amplified the basis for a finding of obviousness under 35 USC 103(a), particularly addressing the showing required to ascertain whether a skilled person would have found it obvious to modify and combine teachings of the prior art to reach claimed subject matter. Drawing on its earlier ruling in *United States v. Adams*, 383 U.S. 39, 40, 86 S. Ct. 708, 15 L. Ed. 2d 572, 174 Ct. Cl. 1293 (1966), the Court "recognized that when a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result." However, the Court also noted that the *Adams* decision "relied upon the corollary principle that when the prior art teaches away from

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combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious."

The *KSR* court also addressed the standard of "obvious to try, stating that:

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In that instance the fact that a combination was obvious to try might show that it was obvious under § 103.

In the present instance, appellant maintains that claims 1, 27, 29, and 32 are not obvious over Jaffee under the standard applied in *KSR*. Appellant submits that the comparative data provided in the specifications and Declarations I and II conclusively establish that the improved smoothness is not a predictable result of the type contemplated in *Adams*, on which the Court relied. Rather, the prior art would have predicted a contrary result, namely preference for using smaller diameter fibers to increase smoothness. The Examiner has also not provided any basis on which a skilled artisan would have selected the particular combination of fiber diameter and length recited by claims 1, 27, 29, and 32 other than appellant's desired smoothness.

Even more importantly, nothing of record would have predicted that the smoothness achieved in appellant's gypsum board would have provided a level of smoothness adequate to sustain painting of a gypsum board without extra surface preparation. Even though there was a perceived need in the art for a paintable surface, no path to a solution was provided.

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Appellant further maintains that the KSR Court's consideration of "obvious to try" is predicated on the existence of a "finite number of identified, predictable solutions" that would potentially lead to "anticipated success" (*supra*, emphases added). Even if, *arguendo*, Jaffee were regarded as providing a finite number of solutions, none of those solutions could properly be termed "identified and predictable." Even less would a skilled artisan have an "anticipated" success the Court required.

Rather, the skilled artisan would have been led in altogether different directions, requiring consideration of average fiber diameter, average fiber length, as well as the tightness of the diameter and length distribution required to attain the desired results. Attainment of the solution at an intermediate value of average diameter, not at the extremes, only emphasizes the errant guidance the prior art would have given.

2. Dependent claims 2-6, 8-15, 17-19, 21-24, and 26 meet the conditions for patentability because Jaffee does not disclose or suggest the gypsum board of claim 1, let alone the gypsum board of claims 2-6, 8-15, 17-19, 21-24, and 26 dependent thereon.

Applicants respectfully submit that claims 2-6, 8-15, 17-19, 21-24, and 26 are patentable for at least the same reasons as claim 1, from which they depend, as well as for additional reasons set forth below.

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- a. Dependent claims 4-6 meet the conditions for patentability because Jaffee does not disclose or suggest the gypsum board of claim 1, let alone the gypsum board of claims 4-6 dependent thereon

The July 25, 2006 Office Action includes the following statement concerning claims 4-6:

As to claims 4 – 6, Jaffee teaches that the glass fibers have an average diameter from about 9 microns to 20 microns (column 3, lines 35 – 40). Jaffee teaches that the mat has a major portion of glass fibers and a minor portion of polyester fibers (Abstract). Jaffee further teaches that a minor portion of the glass fibers can have a diameter of 0.4 – 2 microns (column 3, lines 40-47). (Office Action of July 25, 2006, page 4, paragraph 3.)

The pertinence of this statement to the subject matter of claims 4-6 is unclear to appellant. Claims 4-6 recite a composition of glass fibers in which an increasingly large weight percentage of the fibers have a fiber diameter ranging between about 9.5 and 12.5 μm (90, 95, and 97 wt.%, respectively). None of the claims contemplates a minor portion of polyester fibers, or glass fibers having a diameter of 0.4 – 2 microns, the disclosure to which the Examiner has pointed.

The subsequent Office Action of December 27, 2006 further states:

While Examiner does not suggest that claims 4-6 are or are not patentable over Jaffee, as set forth above, Examiner contends that claims 4-6 are anticipated by the Jaffee reference, as applied to claim 1. (Office Action of December 27, 2006, page 7, paragraph 2.)

The Examiner appears to have conflated Jaffee's disclosure of species in which textile glass fibers are intentionally replaced by a minor portion of microfibers.

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e.g. at a level of 10 wt.% (see Jaffee at col. 6. line 67 *et seq.*), with the restriction of claim 4 that at least about 90 wt.% of the fibers have diameter within the narrow range of 9.5 to 12.5 μm . Applicant maintains that the use of "consists essentially of" precludes such a presence of microfibers, as discussed in detail hereinabove. Even less is there any warrant for the application of the Jaffee disclosure to more preferred claims 5 and 6, which require even higher percentages of the base fibers to be in the narrow range of diameters.

Applicant emphatically traverses the Examiner's suggestion that Jaffee "anticipates" claims 4-6 (Office Action of December 27, 2006, at page 7, line 4). Clearly, there is no disclosure in Jaffee that calls for a narrow range of fiber diameters, as specified by the requirement that at least 90, 95, or 97 wt.% of the fibers lie within the narrow range of about 9.5 to 12.5 μm , as delineated by claims 4-6, respectively. See also the discussion of "anticipation" in Section VII.A.1.a above.

b. Dependent claim 22 meets the conditions for patentability because Jaffee does not disclose or suggest the gypsum board of claim 1, let alone the gypsum board of claim 22 dependent thereon.

Claim 22 depends from claim 1 and further requires the second surface of the board to be faced with a fibrous web of the same type as delineated by claim 1.

Inasmuch as Jaffee fails to disclose or suggest the particular fibrous mat used in the board of claim 1, it is submitted that claim 22, which requires the non-

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woven, glass fiber containing mat on the second surface as well, is *a fortiori* patentable over Jaffee for at least the same reasons.

c. Dependent claim 26 meets the conditions for patentability because Jaffee does not disclose or suggest the gypsum board of claim 1, let alone the gypsum board of claim 26 dependent thereon.

Claim 26 depends from claim 1 and further requires the board to have a flame resistance sufficient to pass the test of ASTM Method E84, Class 1, which applicant maintains is a standard test known to a skilled artisan.

It is submitted that claim 26 is patentable over Jaffee for at least the same reasons as claim 1 delineated above in Section VII.A.1., and for additional reasons here delineated.

Specifically addressing claims 26 and 31 (the latter directed to air permeability), the Examiner has admitted that Jaffee fails to explicitly teach the claimed flame resistance or permeability, but has asserted that:

...it is reasonable to presume that said properties are inherent. Support for said presumption is found in the use of like materials (i.e. a gypsum board sandwiched by two facing layers comprising chopped glass fibers having a diameter from 9.5 - 12.5 microns which would result in the claimed properties. The burden is upon the Applicant to prove otherwise. *In re Fitzgerald* 205 USPQ 594. In addition, the presently claimed property would obviously have been present once the Jaffee product is provided. Note *In re Best*, 195 USPQ at 433, footnote 4 (CCPA 1977) as to providing of this rejection made above under 35 USC 102. (Office Action of July 25, 2006, page 7, paragraph 2.)

Applicant respectfully submits that the Examiner's reliance on *Fitzgerald* and *Best* is misplaced, inasmuch as the factual situation required for those cases to be

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apposite is not satisfied in the present instance. The Examiner further points to footnote 4 of the *Best* decision for the proposition that a rejection may be made alternatively for obviousness under 35 USC 103 or anticipation by inherency under 35 USC 102.⁷ However, the *Best* holding, which was affirmed by *Fitzgerald, supra*, was predicated on the substantial identicity of the claimed and prior art products. ["Where, as here, the claimed and prior art products are identical or substantially identical... the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product." *Best, supra*, at 1255, emphasis added.]

Under MPEP §2144.04, legal precedent may be used as a basis for an obviousness rejection, but only if the facts in a prior legal decision are "sufficiently similar to those in an application under examination." In the present instance, therefore, the gypsum board of claim 26 and the fibrous mat of claim 31 must be substantially identical to the gypsum board and fibrous mat allegedly provided by the Jaffee disclosure for *Fitzgerald* and *Best* to be applicable.

Applicant respectfully traverses any such identification. The Examiner has asserted (albeit erroneously) that Jaffee does not disclose or suggest flame resistance, but instead relies on the presumed inherency of such a feature in the Jaffee gypsum board.

⁷ The pertinence of this reference to rejection under 35 USC 102 is unclear. It may have arisen from replication of the quoted argument from earlier Office Action, e.g. section 13 of the Office Action dated December 27, 2004, in which claims 26 and 31 were rejected over Jaffee in the alternative under either 35 USC 102(b) or 35 USC 103(a). The present rejection, from which this appeal is taken, did not maintain any 35 USC 102 rejection of any claims.

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Contrary to the Examiner's statement, Jaffee is far from silent as to flame resistance. Instead, Jaffee expressly regards some mats within his broad ambit as having good flame resistance, whereas others do not. Attention is respectfully drawn to Jaffee's col. 5, lines 58 and 64-65; and col. 6, lines 37 and 39. Significantly, the high loss on ignition of Jaffee's Examples 3 and 4 (within his claim scope) are attributed to the presence of polyester fiber (col. 6, lines 41-43).

As a result, it is maintained that the burden to prove that the claimed properties are not exhibited by the Jaffee mat has not properly been shifted to applicant. The Examiner thus has not established a proper basis on which the rejection based on presumed inherency could properly be predicated.

Even if the burden were properly shifted, inherency must be established by certainty, not probability. *In re Anthony et al.*, 169 F.3d 743, 745; 49 U.S.P.Q.2D (BNA) 1949 (Fed. Cir. 1999). Applicant maintains that the Examiner's assertion cannot be regarded as certain, given Jaffee's disclosure that at least some of his mats do not exhibit high flame resistance. At best, the Examiner's argument would have to be that the particular mats claimed by applicant would inherently be flame resistant. However, no evidentiary basis has been established to show which of the Jaffee mats would be resistant, so the assertion must therefore be regarded as impermissible hindsight.

3. Dependent claims 30-31 meet the conditions for patentability because Jaffee does not disclose or suggest the fibrous mat of claim 29, let alone the fibrous mat of claims 30-31 dependent thereon.

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Applicant respectfully submits that claims 30-31, being dependent from claim 29, are patentable for at least the same reasons as claim 29, from which they depend.

- a. Dependent claim 30 further meets the conditions for patentability because Jaffee does not disclose or suggest the claimed fibrous mat.

Applicant respectfully submits that the arguments set forth in Section VII.A.2.a above concerning the narrow distribution of glass fiber diameters delineated by claim 4 apply with equal force to claim 30. Claim 4 recites a gypsum board wherein the fibrous mat employs glass fibers, of which at least about 90% by weight of said chopped glass fibers have a diameter ranging between about 9.5 and 12.5 μm . Claim 30 is a subcombination claim directed to a fibrous mat and recites the same limitation on the glass fiber diameter distribution. Clearly, Jaffee discloses a blend of glass fiber diameters, not a narrow range, let alone the particularly restricted range of claims 4 and 30.

- b. Dependent claim 31 further meets the conditions for patentability because Jaffee does not disclose or suggest the claimed fibrous mat.

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Claim 31 additionally requires an air permeability of at least about 300 cfm/ft² measured by the Frazier test. Ordinarily, gypsum board is produced using a wet slurry deposition process, such as that delineated by claim 28 of the present application, now withdrawn under a restriction requirement. In such a process, excess water must be extracted through the facers during curing of the gypsum. Such extraction is implicit in drying step (d) of claim 28. A high air permeability, such as that provided by claim 31, is thus beneficial in facilitating the extraction.

The Examiner has alleged that the claimed permeability is an inherent property of a Jaffee mat, using the same arguments applied in regard to the flame resistance recited by claim 26:

Second, regarding Applicant's argument that the flame resistance and high permeability of the mat, which permits easy extraction of excess water present in the gypsum slurry during broad fabrication, Examiner respectfully disagrees. Applicant does not appear to argue that the structure disclosed in the Jaffee reference, other than the polymer fibers, is distinguished from the claimed invention. Jaffee discloses an identical structure and chemical composition as the claimed invention. The structure in Jaffee must meet the flame resistance and high permeability of the mat. The claimed invention does not set forth additional structural or chemical requirements which may distinguish the claimed invention from the prior art. Therefore, the properties are deemed inherent to the claimed structure and the structure in the prior art as they both contain identical structural and chemical compositions. Applicant has not provided evidence which suggests that the properties are unique to the claimed invention and would not be apparent to the structure disclosed in Jaffee. (Office Action of December 27, 2006, page 6, paragraph 2.)

Applicant respectfully traverses the assertion that the Jaffee mat contains "identical structural and chemical compositions" and the implied inherency of the claimed air permeability. For at least the reasons set forth in Sections VII.A.1 and VII.A.2.c above concerning claims 1 and 26, respectively, Jaffee does not anticipate the

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present mat. In addition, applicant maintains the Examiner is obliged to show that the allegedly inherent property of claim 31 also is a certainty, not a probability.

To the contrary, teaching, both within Jaffee and in further prior art sources, negates the allegedly certain inherency of the claimed air permeability.

There is even less warrant for applying the *Fitzgerald* or *Best* decisions to claim 31 than to claim 26, because of Jaffee's own disclosure. Far from being silent as to permeability, Jaffee teaches that mat having a minor portion of glass microfibers (i.e. fibers smaller in diameter than applicant's chopped glass fibers) has very small windows that catch very fine particles and provide high efficiency filtration. Such teaching would be regarded by a skilled person as indicative of a low air permeability, not a high air permeability. Applicant thus submits that the finding that a high permeability can be attained in mat comprising fibers of smaller diameters, as delineated by claim 31, as amended, is surprising and unexpected. Such properties are exhibited by exemplary mats of the invention, e.g. as set forth in the Examples of Table 3.

Applicant also maintains that in view of Jaffee's clear disclosures regarding air permeability and the structural and compositional differences between Jaffee's blended fiber mats and applicant's, the "reasonable basis" required under *Best* and *Fitzgerald* cannot be established. Thus, the burden to prove that the claimed properties are not exhibited by the Jaffee mat has not properly been shifted to applicant. Accordingly, it is submitted that the Examiner has not established a proper basis on which the rejection based on presumed inherency could properly be predicated.

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Applicant has further pointed, *arguendo*, to US Patent 4,637,951 to Gill et al., which discloses a fibrous glass mat that includes a majority of base fibers having a mean diameter in the range of 10 microns with a minor amount of microfibers (Abstract). Importantly, such a mat has a fiber content that lies within the ranges delineated by Jaffee, which teaches an embodiment that can include microdenier synthetic polymer fibers in minor proportions in combination with glass fibers having average diameters from about 9 microns to about 20 microns. See, e.g., col. 3, lines 38-40 and 47-50 of Jaffee. However, the Gill et al. mat preferably has a porosity of no greater than 225 cubic feet per minute per square foot of mat as measured using the Frazier Air Permeability Test (Abstract). In other embodiments, the Gill et al. mat has even lower air permeability, e.g. 180 cubic feet/min (col. 5, line 59); and 40-225 cubic feet/min (claims 3 and 12). Such data clearly refute any presumption that all mats disclosed by Jaffee inherently and necessarily have an air permeability of greater than about 300 cubic feet/minute/square foot, as delineated by claim 31. ["Before a reference can be found to disclose a feature by virtue of its inherency, one of ordinary skill in the art viewing the reference must understand that the unmentioned feature at issue is necessarily present in the reference. The test of inherency is not satisfied by what a reference 'may' teach. ('Inherency . . . may not be established by probabilities or possibilities. The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient.') (*SGS-Thomson Microelectronics, Inc. v. International Rectifier Corp.*, 32 USPQ 2d 1496, 1503 (Fed. Cir.) (unpublished), *cert. denied*, 513

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U.S. 1052 (1994), quoting *Continental Can*, 948 F.2d at 1268-69, 20 USPQ 2d at 1749-50.)

Even if certain Jaffee mats might have higher air permeability, some do not. By sheer logic, even the Examiner's presumption is not reasonable, let alone certain. At best, it is hindsight reconstruction.

Applicant respectfully submits that the Examiner's dismissal of the foregoing argument with respect to Gill is improper, it being alleged that the applicant is required to show that the mat of Jaffee does not inherently have applicant's air permeability range. Applicant continues to maintain the position that the burden of showing the prior art Jaffee mat does not have applicant's claimed air permeability range has not been properly transferred to applicant under the *Best* and *Fitzgerald* standard. However, even if *arguendo* that burden has been shifted, it is submitted that the Gill teaching remains pertinent and rises to the level of any required showing, because the Gill mats are Jaffee mats. That is to say, the mats disclosed by Gill contain fibers that clearly fall within the range delineated by Jaffee and the claims thereof.

In the present instance, the Examiner has not pointed to any disclosure or suggestion in Jaffee (or elsewhere) that differentiates the air permeability of mats broadly disclosed therein, at least some of which lack the air permeability required by claim 31, from those made with the particular range of average glass fiber diameter recited by applicant. Accordingly, it is submitted that the preferred mat delineated by claim 31 is novel and unobvious over Jaffee.

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4. Conclusion

In view of the foregoing remarks, it is submitted that present claims 1-6, 8-15, 17-19, 21-24, 26, 27, and 29-32 patentably define over Jaffee. Accordingly, reversal of the rejection of claims 1-6, 8-15, 17-19, 21-24, 26, 27, and 29-32 under 35 USC §103(a) over Jaffee is respectfully requested.

B. The gypsum board of claim 20 meets the conditions for patentability, because Jaffee and Horner, whether taken singly or in combination, do not disclose or suggest the subject matter of claim 1, let alone the subject matter of claim 20 dependent thereon.

The Examiner has rejected claim 20 under 35 USC §103(a) on the following basis:

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 5,772,846 to Jaffe, as applied to claims 1-6, 8-15, 17-19, 21-24, 26, 27, and 29-32, in view of USPN 6,365,533 to Horner, Jr. Claim 20 remains rejected as substantially set forth in the Non-Final Rejection of July 25, 2006, section 4. (Office Action of December 27, 2006, page 12, paragraph 3.)

The Examiner's Non-Final Rejection of July 25, 2006 included a substantially identical statement of rejection of claim 20.

Horner relates to a low fiber, pliable facer suitable for use in insulation board manufacture. Significantly, there is no disclosure or suggestion in Horner of any gypsum or hydraulic set board.

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1. Horner does not cure Jaffee's lack of disclosure of the subject matter of claim 1, from which claim 20 depends.

The Examiner has not pointed to any disclosure in Horner of a fibrous mat comprising a non-woven glass fiber web of the type required by claim 1. Accordingly, Horner does not cure Jaffee's lack of disclosure of such a mat.

Instead, the Examiner has cited Horner as disclosing a kraft paper facer and for the unremarkable proposition that both faces of a construction board may be faced with the same material.

Furthermore, applicant respectfully maintains that a skilled person would not be motivated to look to Horner, which is directed to insulating boards and foamed facers used thereon, for guidance in designing the gypsum boards of claims 1 or 20. Even if *arguendo* Horner provides a kraft paper facer for one surface, and suggests use of a different facer for the other, there is no disclosure, suggestion, or motivation to use the particular fibrous web recited by claim 1.

2. Conclusion

In view of the foregoing remarks, it is submitted that present claim 20 patentably defines over Jaffee and Horner. Accordingly, reversal of the rejection of claim 20 under 35 USC §103(a) over Jaffee and Horner is respectfully requested.

C. The gypsum board of claim 25 meets the conditions for patentability.

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The Examiner has rejected claim 25 under 35 USC §103(a) on the following basis:

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 5,772,846 to Jaffe, as applied to claims 1-6, 8-15, 17-19, 21-24, 26, 27, and 29-32, in view of USPN 7,056,582 to Carbo. Claim 25 remains rejected as substantially set forth in the Non-Final Rejection of July 25. (Office Action of December 27, 2006, page 13, paragraph 2.)

The Examiner's Non-Final Rejection of July 25, 2006 included a substantially identical statement of rejection of claim 25.

Carbo discloses acoustical tiles, also known as acoustical panels, ceiling tiles, or ceiling panels, that are said to inhibit the growth of fungus, bacterial and other micro-organism.

1. Carbo does not cure Jaffee's lack of disclosure of the subject matter of claim 1, from which claim 25 depends.

The Examiner has not pointed to any disclosure in Carbo of a fibrous mat comprising a non-woven glass fiber web of the type required by claim 1. Accordingly, Carbo does not cure Jaffee's lack of disclosure of such a mat.

2. Conclusion

In view of the foregoing remarks, it is submitted that present claim 25 patentably defines over Jaffee and Carbo. Accordingly, reversal of the rejection of claim 25 under 35 USC §103(a) over Jaffee and Carbo is respectfully requested.

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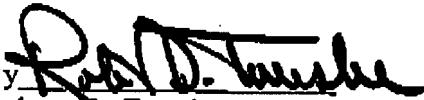
(VIII) Conclusion

In light of the foregoing remarks, it is respectfully submitted that the gypsum board of claim 1 (and claims 2-6 and 8-26 dependent thereon); the improved gypsum board of claim 27; the non-woven fibrous mat of claim 29 (and claims 30-31 dependent thereon); and the hydraulic set board of claim 32 are not disclosed or suggested by any combination of the art references applied, and thus meet the conditions for patentability required by 35 USC §103(a).

Accordingly, reversal of the rejection of claims 1-6, 8-15, 17-27, and 29-32 under 35 USC §103(a), and allowance of the present application, are earnestly solicited.

Respectfully submitted,

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(IX) Claims Appendix — Claims On Appeal

1. A gypsum board, comprising:
 - a. a gypsum layer having a first face and a second face and comprising set gypsum; and
 - b. first and second facers affixed to said first and second faces, said first facer being a fibrous mat comprising a non-woven, glass fiber web bonded together with a resinous binder, and said glass fibers consisting essentially of chopped glass fibers having an average fiber diameter ranging from about 9.5 to 12.5 μm and an average fiber length ranging from about 6 to 12 mm.
2. A gypsum board as recited by claim 1, wherein said chopped glass fibers are composed of at least one member selected from the group consisting of E glass, C glass, T glass, sodium borosilicate glass, and mixtures thereof.
3. A gypsum board as recited by claim 1, wherein said chopped glass fibers are composed of E glass.
4. A gypsum board as recited by claim 1, wherein at least about 90% by weight of said chopped glass fibers have a diameter ranging between about 9.5 and 12.5 μm .
5. A gypsum board as recited by claim 1, wherein at least about 95% by weight of said chopped glass fibers have a diameter ranging between about 9.5 and 12.5 μm ..

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6. A gypsum board as recited by claim 1, wherein at least about 97% by weight of said chopped glass fibers have a diameter ranging between about 9.5 and 12.5 μm .
7. (cancelled)
8. A gypsum board as recited by claim 1, wherein at least a majority of said chopped glass fibers have a fiber length ranging from about 6 to 18 mm.
9. A gypsum board as recited by claim 1, wherein said resinous binder is composed of at least one member selected from the group consisting of urea formaldehyde; conventional modified urea formaldehyde; acrylic resin; melamine resin; high nitrogen melamine resin; homopolymer and copolymer of polyacrylic acid having a molecular weight of less than 10,000; crosslinking acrylic copolymer; crosslinked vinyl chloride acrylate copolymer; and modified acrylic latex binder.
10. A gypsum board as recited by claim 1, wherein said resinous binder is composed of a modified acrylic latex binder.
11. A gypsum board as recited by claim 9, wherein said resinous binder further comprises a cross-linker in an amount ranging up to about 10 weight percent.
12. A gypsum board as recited by claim 11, wherein said cross linker is present in an amount ranging from about 2 to 5 weight percent.
13. A gypsum board as recited by claim 11, wherein said resinous binder comprises melamine formaldehyde.

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14. A gypsum board as recited by claim 1, wherein said resinous binder has a glass transition temperature ranging from about 15 to 45°C.
15. A gypsum board as recited by claim 1, wherein said resinous binder further comprises at least one water repellent agent.
16. (cancelled)
17. A gypsum board as recited by claim 1, wherein said fibrous mat has a basis weight ranging from about 0.6 to 2.2 pounds per 100 square feet.
18. A gypsum board as recited by claim 17, wherein said fibrous mat has a basis weight ranging from about 0.9 to 2.2 pounds per 100 square feet.
19. A gypsum board as recited by claim 18, wherein said fibrous mat has a basis weight of about 1.25 ± 0.2 pounds per 100 square feet.
20. A gypsum board as recited by claim 1, said second facer comprising kraft paper.
21. A gypsum board as recited by claim 1, said second facer comprising a fibrous mat.
22. A gypsum board as recited by claim 1, said second facer being a fibrous mat comprising a non-woven, glass fiber web bonded together with a resinous binder, and said glass fibers consisting essentially of chopped glass fibers having an average fiber diameter ranging from about 9.5 to 12.5 μm and an average fiber length ranging from about 6 to 12 mm.
23. A gypsum board as recited by claim 1, wherein said gypsum core further comprises at least one water repellent agent.

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24. A gypsum board as recited by claim 1, wherein said gypsum core further comprises reinforcing fiber.
25. A gypsum board as recited by claim 1, wherein said gypsum core further comprises a biocide.
26. A gypsum board as recited by claim 1, said board having flame resistance sufficient to pass the test of ASTM Method E84, Class 1.
27. In a gypsum board having a first face and a second face and a non-woven fibrous mat affixed to at least one of said faces, the improvement wherein said mat comprises a glass fiber web bonded together with a resinous binder and said chopped glass fibers consist essentially of glass fibers having an average fiber diameter ranging from about 9.5 to 12.5 μm and an average fiber length ranging from about 6 to 12 mm.
28. (withdrawn) A process for manufacturing an article comprising a hydraulic set material layer having first and second faces, and first and second facers affixed thereto, at least said first facer comprising a non-woven, fibrous mat, the process comprising:
 - a. providing said non-woven, fibrous mat having a fibrous web composed of chopped continuous glass fibers having an average fiber diameter ranging from about 9.5 to 12.5 μm bound together with a resinous binder;
 - b. forming an aqueous slurry comprising at least one member selected from the group consisting of anhydrous calcium sulfate, calcium sulfate hemihydrate, and hydraulic setting cement;

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- c. distributing the slurry to form a layer on said first facer;
 - d. applying said second facer onto the top of said layer;
 - e. separating the resultant laminate into individual articles; and
 - f. drying the articles.
29. A fibrous mat comprising a non-woven glass fiber web bonded together with a resinous binder, said glass fibers consisting essentially of chopped glass fibers having an average fiber diameter ranging from about 9.5 to 12.5 μm and an average fiber length ranging from about 6 to 12 mm.
30. A fibrous mat as recited by claim 29, wherein at least about 90% by weight of said chopped glass fibers have a diameter ranging between about 9.5 and 12.5 μm .
31. A fibrous mat as recited by claim 29, said mat having a permeability of at least about 300 cfm/ft² measured by the Frazier test.
32. A hydraulic set board, comprising:
- g. a hydraulic set material layer having a first and a second face; and
 - h. first and second facers affixed to said first and second faces, at least of said first facer being a fibrous mat comprising a non-woven, glass fiber web bonded together with a resinous binder, said glass fibers consisting essentially of chopped glass fibers having an average fiber diameter ranging from about 9.5 to 12.5 μm and an average fiber length ranging from about 6 to 12 mm.

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(X) Evidence Appendix

Not applicable.

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(XI) Related Proceedings Appendix

Not applicable.